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VOLUME XII
Number 26

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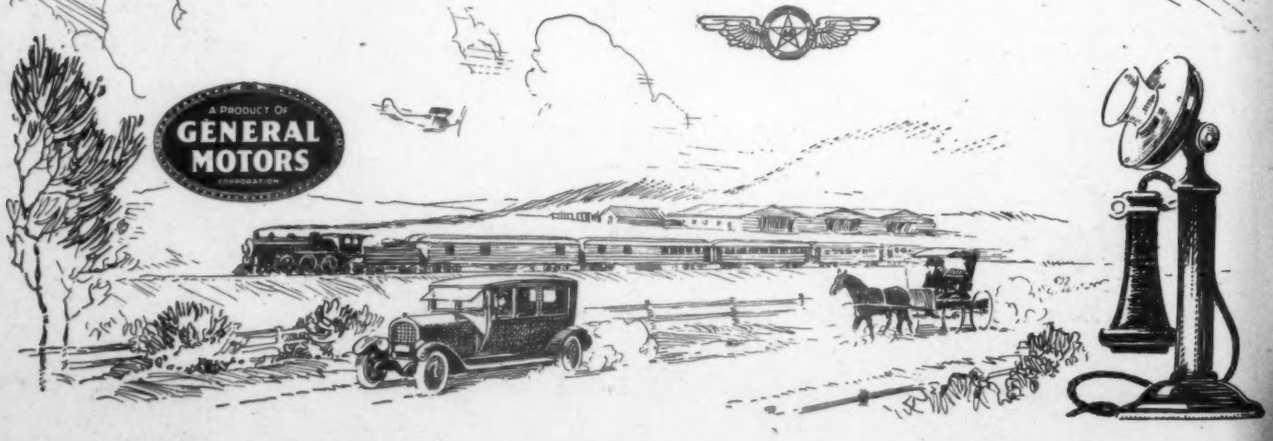

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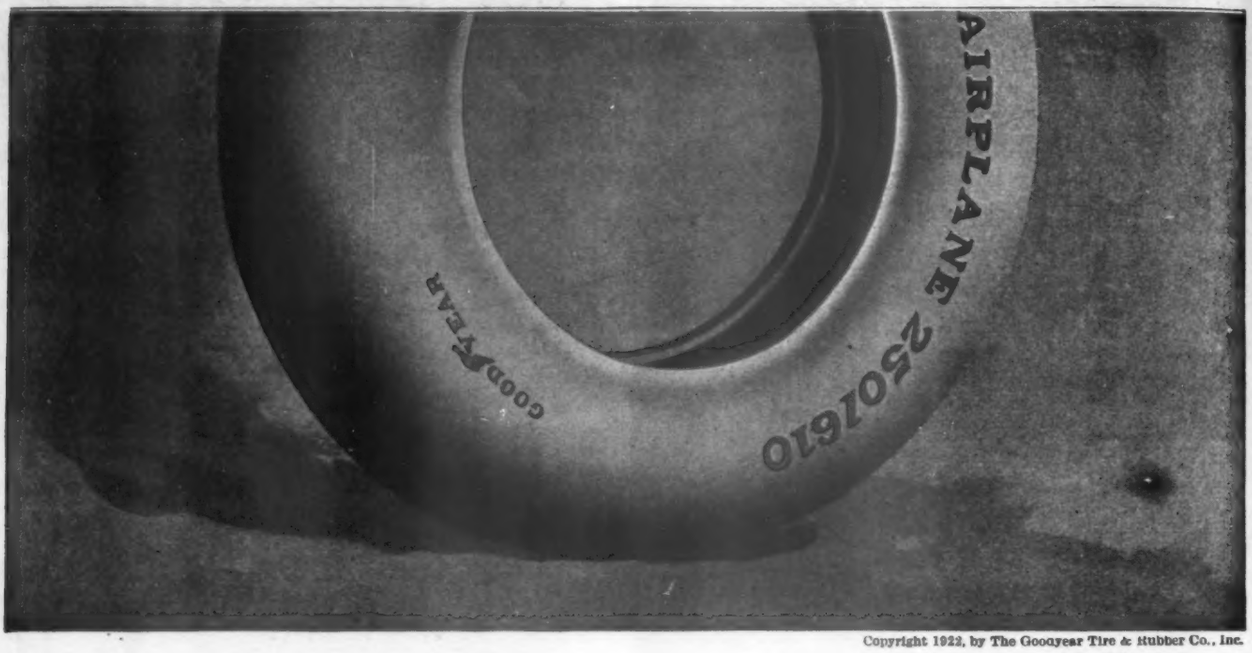

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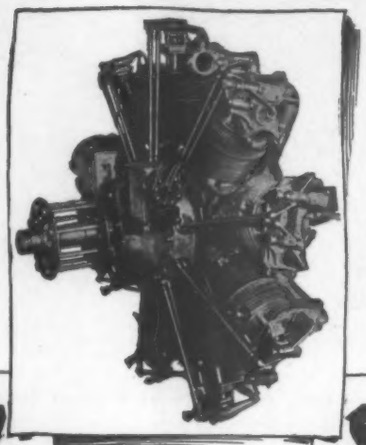

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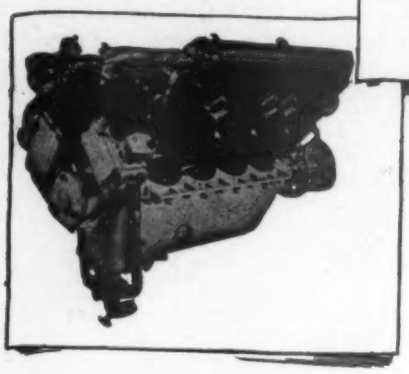

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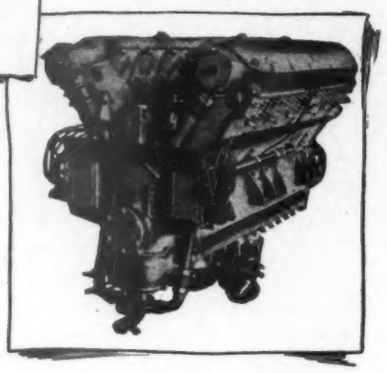

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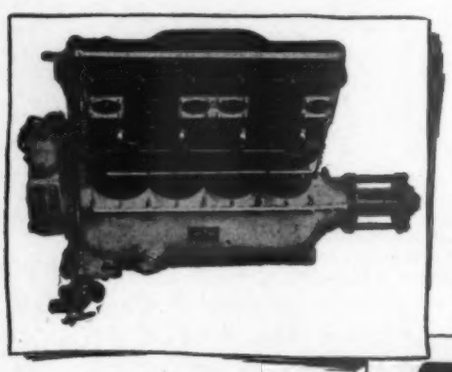

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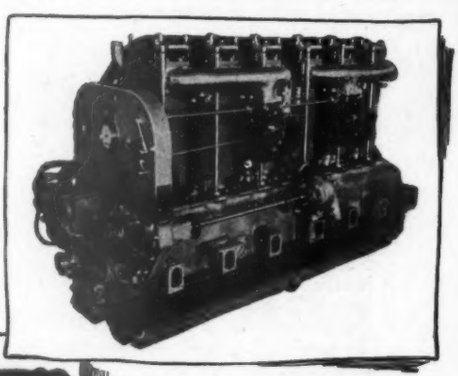

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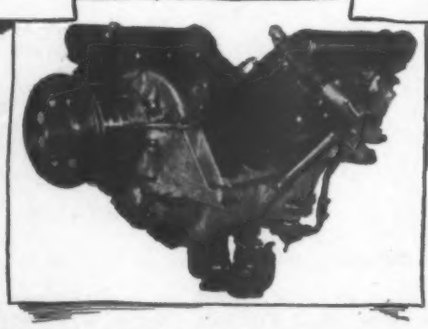

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JUNE 26, 1922

AVIATION

VOL. XII. NO. 26

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CONTENTS

Editorials 745
Experiences in the National Balloon Race 746
Soaring Flight and its Mechanical Solution 750
The Commercial Operation of Flying Boats 752
Regarding a U. S. Academy of Aeronautics 753
Current Air Appropriations 754
Air Service Tests New Instruments 755
Round the World Flight 756
Can the "Petrel" be Spun? 756
Canadian Technical Memoranda 756
War Department and Civil Aviation 756
Army and Navy Air News 757
Coming Aeronautical Events 759
Foreign News 760
Brief Trade Notes 760

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Vol. XII JUNE 26, 1922 No. 26

The Function of Air Power

ALL those who take an intelligent interest in questions of national defense and who, for this reason, favor the building up of a strong National Air Force as well as of a nationwide aeronautical opinion to support this service, will read with interest two letters reproduced in this issue. They were sent to the President of the Senate by the Secretaries of War and of the Navy, respectively, in response to a Senate Resolution in regard to the feasibility of establishing an Academy of Aeronautics, its possible location at West Point or Annapolis, and of the conversion of an arsenal or a Navy yard into a government aircraft factory.

It might be well to state that we do not take sides as to the merit of these propositions; indeed we rather feel that the creation of an Academy of Aeronautics would be premature without the existence of a National Air Force, and we do not see any need for an additional government aircraft factory while McCook Field and the Naval Aircraft Factory are functioning.

The replies of the Secretaries of War and Navy are both decidedly opposed to the scheme of an aeronautical academy: the War Department finds it inadvisable because the Air Service already has special training schools, while the Navy Department fears that it would be "most detrimental to the Navy's interests and to the purpose for which the Navy equips its aviators." And both departments are cordially agreed that they are quite sufficient unto themselves insofar as aviation is concerned, as appears from the following dogmas which have all the air of intangibility:

"The Air Service of the United States Army, as prescribed in the Act of June 1920, is sufficient for military needs." (War Department.)

"Whatever the Navy needs most in training is best taken care of by the Navy itself." (Navy Department.)

Here then we have the whole situation in a nutshell. The cleverest advocate of a single air force could not have improved upon these dogmas in an effort to show that soldiers and sailors still think of the air force in terms of military and naval warfare instead of considering aerial warfare from an aeronautical point of view. This was precisely the reason which prompted the British government during the war to create an independent air ministry with its air staff, for until then "sailors and soldiers would continue to think of the air force in terms of their own service and would not pursue its development as an independent force outside the purpose with which it was associated and for which they desired that it should be employed." (Austen Chamberlain in the House of Lords.)

In other words, the Army and the Navy both are willing and eager to employ aviation as an arm of the services, for scouting in the first place, and secondarily for attack against aerial, terrestrial and naval objectives because they realize that the new arm immensely increases their fighting efficiency. But that is just as far as they are interested in aviation. They are not at all keen on developing aerial warfare to its logical conclusion, that is, to create an aerial striking force with its own staff, which sooner or later must become the first line of defense of the nation. Their attitude is, with all its selfishness, extremely human—but it is a highly dangerous one, too, in that it lulls the nation into a false sense of security, unwarranted by well established facts.

The next war will open with aerial bombing raids, probably at night, of a magnitude undreamed of during the last war, and long before the armies and navies will have established contact. These attacks will not be directed separately by armies and navies according to whether the objective is a seaport or an inland town: the objectives will form in their totality a strategic program elaborated by an aerial staff for the purpose of acquiring at once command of the air. This means not only destroying the opponent's air force but also the wiping out of his aeronautical bases and manufacturing plants.

Thus aerial stategy will decide in a day or two the initial mastery in the struggle, and perhaps the outcome of the war. Can we truthfully say that our present air services, which primarily answer military and naval needs, are capable of defending the United States against attack by an air force directed by an aerial staff which is unhampered by military or naval limitations in considering its objectives?

The Berliner Helicopter

THE report, authenticated by photographs which dispel any doubt, that the latest Berliner helicopter has actually flown in a horizontal plane, will come as cheering news to those whose faith in the ultimate success of the direct lift machine has not been dimmed by the arduousness of the task.

As we said some time ago, several helicopters have lifted off the ground and have hovered, but an authentic instance of a controlled horizontal flight was yet lacking. Owing to the methodic efforts of Emile Berliner, the inventor, and of his son Henry, who tests the elder Berliner's machines in flight, we have come considerably nearer the solution of the helicopter problem. This problem is primarily one of stability, and secondarily one of propulsion. To solve the former Mr. Berliner devised a series of vertical vanes, controlled by the pilot, whereby a given portion of the propeller disk area can be blanketed, which introduces a restoring couple. For horizontal propulsion a separate propeller, inclined to the path of flight, is mounted aft on the fuselage, and is apparently gear-driven from the engine. The entire arrangement is very neat for an experimental machine and further trials of the Berliner helicopter will be watched with interest.

Experiences in the National Balloon Race

Interesting Accounts by Major Westover, Ralph Upson, Lieutenant Reed and Commander Norfleet

Following are several accounts of the trips made by participants in the National Balloon Race which was held at Milwaukee May 31, last.

Maj. Oscar Westover, A.S., who carried off first honors in the National Balloon Race which started from Milwaukee May 31 has returned to Washington to prepare for his trip abroad. Major Westover will be the leader of the balloon team which will defend the American colors in the Gordon Bennett international balloon race at Geneva, Switzerland, Aug. 6.

Major Westover's Story

Discussing his experience in the National Balloon Race Major Westover became enthusiastic over the possibilities offered by free ballooning for advancing aerial science.

"I believe there will be very great advantage in promoting free ballooning, as I think it offers the best opportunity to apply a knowledge of meteorology," said Major Westover, pointing furthermore to the benefits to flying in general from a continued pursuance of meteorology and constant development of the present knowledge of the science.

Best for Observation Purposes

"Free ballooning offers," he said, "perhaps the best opportunity to study the weather phases of flying, as the balloon travels at less speed than a flying machine and offers better opportunity for observation in the air."

Major Westover paid high tribute to his aid, Lieut. Carlton F. Bond, who, according to him gave invaluable assistance on the flight.

"We were second to start," said Major Westover. "There was a brisk breeze, and the aim was to clear the grand stand and get off to a start without becoming entangled.

"But it was necessary to sacrifice sixteen of the thirty-five bags of ballast, each weighing 50 lb. And, by the way, I believe that if we had had some of this ballast later, we might have stayed in the air much longer and perhaps have excelled the distance record. Five hours more would have carried us to the coast of Labrador or Newfoundland.

"Up through the clouds we shot, and then it was a matter of making a careful search for a current of air I knew to be there. There was a lull, and the wind died down, but I knew from the veil-like film of cloud that the current of air I wanted was there. It was but a matter of locating it, and our course was assured.

Explains Change in Course

"The air current I sought was but 100 ft. thick. Once found, it required constant juggling of ballast, due to expansion of gas from sunlight, and making our way through clouds. Half-way across Lake Michigan, we released a pilot balloon. It turned north, then eastward, at a faster speed and higher by 3000 ft. than our altitude. I knew then that it was to be our game to get higher up. We rose higher and stayed from 9000 to 10,000 ft. in the air from 8 p. m. to daybreak.

"I knew we were making fast time, and it was fast enough for night travel. Besides, it was our intention to travel faster the next day, and we did pick up speed at daybreak.

"At Muskegon the earth was visible, but at no other time during the flight until shortly before landing was it visible. What seemed to be earth was sighted through the clouds, and on passing above the country surrounding Lake Ontario, the lake was visible about 40 miles to the right of the balloon.

"Our flight keeping at an altitude of 15,000 ft. led us to what we believed to be Lake St. John. It appeared to be a pretty big body of water. One hundred and fifty pounds of ballast was dropped and a quick decision to come down was made. I told my aid to get busy at once and let down all equipment we could spare, except food, clothing and instruments, to check the fall.

Ditch Wireless and Oxygen

"We ditched our wireless and oxygen tanks and let out more sandbags. I feared we would be in the predicament of the Navy fliers if we were to crash down in the rainstorm. As it was, we were bumped from tree to tree after we came down. The actual landing was made at 9.15 in the morning, but we were battered around until about 10 o'clock, when the balloon was ripped and tied down.

"The landing was made in a forest of alder trees, and this was fortunate, as they are trees that are yielding and did not damage the balloon. After a landing had been made, we started off to look for some signs of human habitation. We came to a woodsmen's trail, and eventually reached a fork. After a debate as to which way to go we decided to turn to the right in a direction in which we had last seen the lake, and after walking two miles, we sighted a plowman in a field. He was the only man in the village who was able to speak English.

"The next day the balloon was moved. The return trip to the landing place was made by sled and part of the time on foot. It was necessary to fell trees for some distance around the balloon to prepare it for loading. The guy lines caught in roots and underbrush covering the ground. Finally the bag was loaded on one sled and the basket on another sled. It was a hard job."

Lt. Comdr. J. P. Norfleet and Chief Rigger J. F. Shade in the basket of the Navy helium balloon

Help Given by People

Then the trip was begun to the town of Metabachouan, with the two balloonists standing on the rear of the sleds. Time after time the sleds toppled over, the balloonists going over with them. At times the horses went down on their haunches in the mire. They pushed on to St. Andre de L'-Epouvante, where they repacked the balloon for shipment. They reached the town too late to get a train to Montreal.

"The people were wonderful in helping us," was the praise given the townspeople by Major Westover. "They gave us all kinds of assistance." Major Westover made it clear that the $1,000 money prize for first place in the balloon race will be replaced by a trophy, as regulations do not permit Army fliers to accept any monetary reward in a contest.

The flight was made at an average speed of 50.6 m.p.h. During the 17 hr. in the air, Major Westover said he managed

Lieut. W. F. Reed, U.S.N., pilot of the Navy hydrogen balloon, who finished third

to get 40 min. of sleep, as his eyes began to smart badly. The basket measuring 4 by 5 ft., with equipment occupying considerable space, left cramped quarters for the two men.

The wireless telephone of the balloon gave every satisfaction. At frequent intervals during the trip Major Westover tested out the radio apparatus and tested voice sounds at 11,000 ft. altitude.

Commander Norfleet's Trip

The helium filled Navy balloon piloted by Comdr. J. P. Norfleet left the field at Milwaukee at 4.50 p. m., daylight saving time, and proceeded in an easterly direction until about 8.00 o'clock, when the wind direction changed to south and southwest.

At 8.00 p. m. it passed west of Chicago and at 9.00 p. m. passed over Joliet, Ill.; about this time it became very dark, and Joliet was the last land mark distinguished until 6.00 a. m. when the Mississippi River was crossed just above the junction of the Illinois and Mississippi Rivers in Calhoun County, Ill. At 7.45 a. m. the Missouri River was crossed. At this time the pilot expected to get down into Arkansas before the end of the day, as the balloon was making good at least 30 m.p.h.; the wind failed to hold, however, and about noon began to turn to the westward. At 10.30 the balloon passed over Rolla, Phelps County, and two hours later made a land mark in Pulaski County, due west from Rolla. The balloon was now making very little progress away from Milwaukee, so the pilot ascended to 4000 ft., but discovered that the higher winds were blowing from the southwest, which would take him back directly toward the starting point. Therefore, he came down to the surface, and landed at 12.40 p. m., still having about 700 lb. of emergency ballast equipment and 300 lb. of sand.

The total time in the air was 19 hr. 50 min. This time could have been greatly extended had the wind been favorable for increasing the distance from Milwaukee, the starting point. However, with the winds from the southwest, it was necessary to land in order to prevent loss of distance.

Lieutenant Reed's Story

On the afternoon of May 31 there was perhaps the widest range of winds to select from of any balloon race ever held in this country. The Weather Bureau maps showed a cyclonic disturbance was moving northeastward from northern Michigan and a cool wave with clearing weather and northerly winds had set in over the Dakotas, but there were still prospects for thunder-storms over Michigan and Lake Huron. The balloons departed between 4 and 5.30 p. m., 75th Meridian Time, when there were low stratus clouds from the West with surface wind NNW veering gradually to NNE when the last balloon left the field. High aloft at perhaps 10,000 to 15,000 ft. there was a southwest gale but it gave little assurance to the pilots of no interference by thunderstorms over Lake Huron so that the majority preferred the lower and safer routes. The currents from Wisconsin to Arkansas from the surface to a few thousand feet up were from the NE, moderate in force and reliable and bid fair to be reinforced or be continued on account of the northerly progress of a cyclonic disturbance from the Gulf of Mexico. With the SW wind at extremely high altitudes, west winds between 1000 and 10,000 ft. and North to NE winds from 5000 ft. to the ground, a pilot could select currents to drift him to the St. Lawrence Valley, the lower Lakes, any portion of the Ohio Valley or to Missouri. The real racing winds proved to be in the high southwestern and the surface currents from the northeast.

The Start

We left Milwaukee 4.53 p. m. May 31, 1922. Weather cloudy and with low stratus from north northwest. Capacity of balloon 80,000 cu. ft. 51 bags of sand at 30 lb. each. Compass course 160 deg. Speed, 25 m.p.h. Reached Racine at 6.00 p. m., at 2800 ft., temperature 54 deg. Passed east of Kenosha at 6.30 p. m. at 2200 ft., then descended to get the surface wind, and came over land when the Navy's helium balloon was about three miles off shore, bearing SW, and Captain Berry was seen with his basket in the water about half way between Kenosha and Waukegan. I called below to a party to send him assistance, but called again to never mind as he had gotten off, and was ascending rapidly. Captain Berry's basket was covered with waterproof material and it is probable that it did not dip and fill with water, although it must have cost him considerable ballast to get away, and, therefore, affected his racing endurance.

We passed over Waukegan 7.10 p. m., and then remained overland, passing about 10 miles west of Chicago at 8.45 p. m. moving southward at an altitude of 2500 ft.; speed 20 m.p.h.; temperature, 50 deg. From this time on to morning, our hourly positions were dead reckoned by reference to compass and ground speed, our course remaining southward into Iroquois County, Ill., at midnight where it turned southwestward. Some of our data is as follows:

10.40 P. M. Will County. Altitude 3400 ft. Temperature 46 deg.

11.45 P. M. Iroquois County. Altitude 300 to 3500 ft. Temperature 44 to 46 deg.

1.45 A. M. Campaign County. Altitude 3500 ft. Temperature 45 deg. Cloudy; occasionally between 11.00 p. m. and 2.00 a. m. would be above the lower clouds, and observed a generally clear sky with moon and stars visible. Our dead reckoned position at 7.00 a. m., was in the southwest corner of Montgomery County; while our true position as found by speaking to parties on the ground was in the south central portion of Jersey County, a difference in longitude of 40 miles.

It was difficult to keep an accurate check on our ground speed and direction on account of low clouds, and fog, and only occasionally could we see a dim light on the ground. We released a carrier pigeon in Jasper County at 7.00 a. m., which should have reached the Great Lakes Training Station before the night of the 1st. The surface currents over Jasper

County were from the southeast so we remained aloft then drifted slowly eastward, risking a loss in distance for a change in wind conditions, but hoping to regain the lost miles. At 10.00 a. m., we encircled a city which we took for Effingham, Ill., then drifted southwestward. We noted by the swaying of tall grass that the surface wind was from the southeast. We remained high in slower currents, and followed banks of strato-cumulus clouds, but at high altitudes, making slow progress. I did not want to go as fast as these clouds for fear that they would lead me to where thunder storms were forming; also the coolness of their vapor would cause contraction of gas and loss of ballast, so I stayed aloft behind on the clear side.

In Unsteady Air

Over Alton, Ill. we were sent up to 10,200 ft. and lost considerable ballast in a steep descent, but regained equilibrium at 3000 ft. At 4:10 p. m. we almost landed in Charles County, seeking a lower level to get in a current toward the south west, which was plainly visible by the smoke of steamers on the Missouri river, and by ripples on the water. We dropped two dragropes to the ground which enabled us to bound upward again; one rope dragging over a farm house took a turn around a brick chimney, and tore it down; a few seconds before, I called to a child by the back porch to get out of the way of the rope and he just missed being hit by running into the house.

We were sent up again to 10,000 ft. and drifted back across the Missouri River where we handled the valve with care, to prevent another precipitous fall, put the ballast off in big doses to check the downward momentum, and got down to 3000 ft. with less expense of ballast than before in the unstable conditions prevailing there; the last fall caused us to lose only two bags of sand. Everything seemed to work contrary: when we let an ordinary amount of ballast off we would go down, and when we valved out gas we would go up, so we got using both freely to check our ascent or descent. Up to 2:00 p. m. we were in remarkably stable conditions for daytime ballooning.

Our dead reckoned position at 1:00 p. m. was Madison County, and at 2:00 p. m. near Alton, Ill., we made very slow progress until 4:00 p. m. when we reached Alton, Ill., where we encountered almost uncontrollable vertical and cross currents which seemed to band us toward the Missouri River at every descent and we thought we would not last until 9:00 p. m. We were glad to get away from St. Charles County by 7 p. m., finding southwestward drift between 500 and 1000 ft., while above 2000 ft. the air was comparatively calm.

The Second Night

Once settled into a steady current, we took an inventory of our ballast and supplies, and of all disposable materials. We had groceries enough for a week's stay in the wilds of Canada, so we began dropping butter, bread, canned meats, extra water, ballast, fishing tackle, emergency rations, ammunition, water torches, life preservers, and miscellaneous things not necessary in this territory; we also chopped up the extra dragrope, and dropped the pieces over. Our idea was to get rid of this surplus material before dark without injury to people or houses below, and save the sand for ballasting in emergencies at the termination of the flight, for in such emergencies ballast must go off hurriedly to prevent the balloon from bumping ground. This disposal of articles left us with nine bags of ballast for operations after sunrise. Our course remained steady toward the southwest during the night; the sky remained clear, and there was no fog in the valleys. We soon discovered that the temporary ascents and descents of the balloon were due to passage of our airstream over hilly ground, and took care of our ballast and gas to prevent overshooting the altitude desired which was between 500 and 800 ft. Our dragrope which was about 300 ft. in length, was used as an indicator for altitude over the hills, for when it touched, we set our altimeter and then gaged our altitude above the ground to keep it clear of the trees as the Ozark Mountains were approached.

We were tired and sleepy, and many times both of us would be asleep, and would feel the jerk of the rope, and spring to our feet to meet any emergency when too close to the ground; we realized too that we lost speed and were asleep many times when our balloon was carried above the current after passing over a ridge. Daylight found us in the heart of Ozark Mountains in the northern portion of Texas County when we spoke ground, found our exact position, and sent off another carrier pigeon with the message to Great Lakes Training Station near Chicago. Our course was southward between Pulaski and Phelps Counties to Texas County when the wind changed to northwest and took us over Licking, Mo. at an altitude of 800 ft. at 8:15 a. m., the sky then being clouded with strato-cumulus and alto-cumulus clouds. Our ups and downs became frequent in the fickle mountain air currents and we dipped in the valleys with the dragrope in the trees, overshot the hills, 1,000 to 3,000 ft., using the valve freely when it was evident that the sun would not be shaded by a cloud (which always causes contraction of gas and sudden descent) and went on to Shannon County where the wind shifted to west. A west wind would reduce our distance from Milwaukee, and knowing that the usual change to southwest could be expected, and would drift us back north, we picked several fields ahead for a possible landing. We valved to come down in a wheat field. Our dragrope checked our drift, and our basket almost sat in the Current River, missing the water about 10 ft. by dropping over three bags of sand. We jumped the bordering trees, and valved down in a cornfield beside tall sycamore trees at the river on the farm of Charles W. Wells. The basket touched so gently that it would not have broken an egg, and we immediately pulled the rip cord which permitted the gas to escape rapidly, thus preventing the gusts of wind from catching the balloon to drag us. We were entirely out of ballast. Farm hands nearby rendered assistance in folding up the fabric, packing it into the basket, and loading it upon a wagon. A third carrier pigeon was released with a message for Great Lakes at 11:10 a. m.

Down Again

Charles Wells took us in for the night, and we felt truly grateful for his wonderfully good cooperation, soft beds, and excellent meals. We rode bareback on farm horses from the cornfield to the Wells' farmhouse, and signed a contract with Lee Welch to haul the balloon to Salem. We helped him load up, starting him off about 7:00 p. m.

We tried our luck fishing in the crystal waters of Current River in the early morning of June 3. It was most delightful among the mountains, and we reluctantly left at 9:00 a. m., by horseback over the mountain, and valley trails, reaching Rector, Mo. at 11:00 a. m., where we had dinner and hired an automobile to transport us over the mountains to Salem, reaching Salem about 3.00 p. m. where we had a first chance to get a message on the wires telling of our safe aerial voyage.

Ralph Upson's Story

Following is the report on balloon "Townsend" representing Aero Club of Michigan, in National Balloon Race from Milwaukee, May 31, 1922. Ralph Upson, Pilot; C. G. Andrus, Aerologist of the U. S. Weather Bureau, Aide.

Our balloon was formerly "U. S. Army No. 3," loaned to us by the Army, and built by the Goodyear T. & R. Co. for the Army in 1920. It was the heaviest balloon in the race, with structural features not thoroughly up to date, but it was gas tight and in good condition throughout.

Other equipment consisted mainly in material that we brought back from the race in Europe last fall, which included life preservers, water lights, instruments, sounding apparatus, rain canopy, oxygen and breathing apparatus, map board, etc. The one big novelty on this occasion was the radiophone receiver. Negotiations had been entered into previously with both the Westinghouse and General Electric companies on this subject. Inasmuch as they both desired to furnish a receiving set, the General Electric set was turned over to Major Westover, captain of the Army team, while we kept the Westinghouse set. We got service from both companies on installation, and instructions for use.

At first it was contemplated to use the smaller balloon which I had taken out to Milwaukee for the purpose. It was found however, that during the shipment, someone had pounded a long nail through into the balloon, which in handling had torn several large holes through various panels near the top. There were no good facilities for proper repair at Milwaukee, so that when the offer of the Army balloon was made on the last day, it was gratefully accepted. For radio reports arrangements were made previous to the race, with four broadcasting stations:—Chicago, Detroit, Pittsburgh and Schenectady. These were to be based on the regular aviation bulletin issued by the Weather Bureau which we arranged to have telegraphed from Chicago, to the various broadcasting stations.

I wish to say how much we appreciated the courtesy shown us in Milwaukee, and the splendid ability and sportsmanship with which the event was handled by the race management against very unusual difficulties, which were quite arbitrarily put in their way by misguided and self seeking parties.

The Start

A brief study of the weather conditions, shown by data published before the start, lead us to reject the idea of following surface currents toward the south and southwest, in favor of a bold attempt to get into currents taking us east, which we believed existed above the clouds. The result of the race proves that this was the right course, although we ourselves were not to take full advantage of it. As the wind was rather gusty at the ground, and as we wanted to get above the clouds anyway, we arranged with the ground crew so that we would be approximately six bags light when we took the air, carrying about 41 bags, (at 4.25 p. m. eastern time). The result was that we shot up fast, and without further ballast expenditure for the moment, found ourselves above the clouds in the bright sunlight within 20 min. of the time we left the field.

We went almost at once to 6000 ft. altitude, but soon dropped back again to an average of about 5000 ft. where the air seemed a little more stable.

The contraction, due to the disappearance of the sun with its brilliant reflection on the clouds below us, was the greatest I have ever experienced. It was after 10.00 o'clock before the contraction process was fully taken care of, and it cost us altogether 22 bags or over, half of our ballast supply. This loss could be greatly cut down by the use of better radiation resisting fabrics in the construction of the envelope.

We got a radio report on schedule time indicating that the high behind us had weakened somewhat and that the mild low ahead of us was moving further east, which would produce surface winds from the north on the lower lakes the next day.

To get the most out of it, we should have kept the balloon somewhat higher during the night but intentionally compromised to some extent on account of our limited supply of ballast, for we wanted to make sure of being able to get through a second night.

The cloud layer beneath disappeared before we got to the Michigan shore (between Benton Harbor and South Haven, at 10.30 p. m. indicating an average speed from Milwaukee of 16 m.p.h.) Thereafter, for most of the night, it was clear both above and below. Light clouds began collecting above again a little before dawn. When the sun came up, we let the balloon rise because at that time we wanted all the altitude that we could get. The shore line of Lake Erie was soon in sight and we passed over it when our expansion was just about complete.

Over Lake Erie

Our speed up to this time had gradually increased up to about 27 m.p.h. when we were traveling just a little north of east. We were heading practically the full length of the lake but were perfectly satisfied as progress was fairly good and any time we should have to come down, we felt that we would strike the predicted currents to take us over the south shore. As further confirmation of this, another balloon, presumably Lieut. Neeley of the Army, which had originally been above us and ahead, now took a lower altitude and was pulling off gradually toward the south. For some reason, we couldn't get our radio reports at the schedule time that morning. There were plenty of phonograph pieces and other things coming in, but either we did not have it properly adjusted for the weather reports or something slipped at the broadcasting end. A report at this time would have been extremely valuable to us.

For a while equilibrium was fairly good in the neighborhood of 12,000 ft. but the altitude at which we were stable steadily increased after 10.00 o'clock. As it turned out afterward, the favorable wind was pushed up at about the same rate, but we did not realize it at the time. Finally we reached about 15,000 ft. altitude, but even here it soon got unstable and we started on a strong drop precipitated by more clouds forming above. We still did not realize the extent to which the whole wind system was breaking up at the lower altitudes, hence in the anxiety to keep enough ballast reserve for that night, I was rather careful about throwing it, feeling that as soon as we got over shore, there would be a better chance for experimenting. We did however, check the drop before it got as low as wa had been early in the morning and where we had seen the other balloon still making fair progress east by north.

Another rising tendency soon had to be checked by valving, to avoid over expansion. At the end of about an hour and half, we realized by checking our relative position in various ways that we had hardly moved at all during that time. In other words, we were practically becalmed although we had no means over the water of realizing it immediately.

The upper clouds at this time were getting thicker, resulting in considerable contraction for which we threw over a good part of our equipment, so as to save our sand ballast for overland use.

Shore at Last

At this time the shore line was only about 15 miles away and we soon found a current lower down, as predicted, that took us in that direction, although we did a certain amount of back tracking on our course. We proceeded several miles inland before experimenting again at different altitudes and then found that we were losing more and more ground as we went higher.

In a brief consultation, various factors were considered in estimating the altitude to which we would have to go to reach the current we had been in before at 15,000 ft. This included the general change in the weather indications given by the arrangement of lower winds, and finally the appearance of the higher clouds which quickly came rolling in from the southeast. It was our final conclusion that we could not reach the desired current again at this time within the ceiling of that particular balloon, about 20,000 ft. The second night, which we had so carefully saved up for was now before us, but was a liability instead of an asset. Hence we made a quick decision to land before losing any more ground, which already amounted to between thirty and forty miles. We landed at 7 p. m. in practically a calm about 6 miles south of Painesville, Ohio, with one bag of ballast left and practically no dispensable equipment.

The Revised Distances

The Aero Club of America has received from the U. S. Coast and Geodetic Survey the following revised list of distances in statute miles, from the Balloon Park, Milwaukee, Wis., to the landing places of the balloons which participated in the National Balloon Race, May 31, 1922:

Entrant	*Aide*	*Landed near*	*Distance miles*
Westover	Bond	St. Jerome, Canada	866.5
Honeywell	Wade	Neosha, Mo.	553.4
Reed	Mullenax	Eminence, Mo.	431.0
Van Orman	Morton	Fayette, Mo.	370.6
Rasor	Williams	Fulton, Mo.	359.3
Upson	Andrus	Chardon, Ohio	356.3
McKibben	Muller	Auxvasse, Mo.	350.5
Neely	Jordon	Bay Village, Ohio	325.3
Weeks	Burt	Witt, Ill.	275.2
Berry	Ramsdall	Monticello, Ill.	205.0
Von Hoffman	Vencill	Fort Wayne, Ind.	197.4
Norfleet	Shade	Hancock, Mo.	416.1

Soaring Flight and its Mechanical Solution

Observation of Bird Flight Discloses Ability of Birds To Vary Their Wing Area with Changing Wind Pressures

By F. W. Ruben

In view of the considerable attention the problem of soaring flight is receiving in many parts of the country, and the numerous experiments which are being conducted with a view to its solution, the following communication from an experimenter who has investigated the subject from both a theoretical and a practical point of view will be read with interest. While AVIATION does not fully endorse Mr. Reuben's views, particularly in view of the mechanical complication and increase in weight such a machine would represent, we nevertheless believe that his theories regarding the helicoidal wing shape deserve careful consideration. EDITOR.

Contrary to the opinion of nonexistence of soaring as held by some authorities in aerodynamics, other experimenters and researchers like Prof. L. Prandtl of the Göttingen aerodynamical laboratory in Germany are working unceasingly to solve the puzzling phenomena of soaring flight. They refuse to accept the theory of nonexistence of soaring because it is so undeniably demonstrated by nature itself, although the mechanical side of soaring flight has remained a profound mystery. In order to explain soaring, many researchers presuppose the existence of favorable winds, or, as Prof. Prandtl, "air currents having an upward trend and irregularities in the natural wind" ("Soaring Flight", in AVIATION).

If the soarability were dependent on these factors only, its advantages applied to the mechanical flight would be very doubtful. Again, nature is providing us with examples of soaring without any upward trend of air (albatross in South Seas), for some investigators have failed to detect any appreciable upward air currents while soaring was in progress —reservation must be made for slightly upward trend of wind, for nearly all winds are slightly inclined upward. In view of this, the axiom "No soaring without a wind with an upward trend" apparently has no base.

Furthermore, models have been built that did soar in the teeth of the wind without appreciable upward trend, depending on the horizontal force of the wind and gravity only. Any air pressure that produces a high lift-drift ratio will contribute to the soaring provided that the center of lift is so arranged with respect to the center of weight that force of gravity acts as a forward accelerator of the plane.

Factors Affecting Soaring Flight

The amount of soarability is goverened by the wing loading, that is, pounds per square foot of effective surface, and by the air pressure. These two factors are interrelational, so in order to derive the same soaring effect from reduced air pressure, the loading being constant, the sustaining surfaces must be increased accordingly. Increase of the air pressure will result in the lift-drift or lift-soaring, depending on the aerodynamical property of the sustaining surfaces and relative position of their centers of pressure with respect to the center of gravity. From this it follows that in order to derive any forward acceleration in a horizontal wind without loss in elevation this wind must exert on the plane more force than merely that required for sustentation, or there will be no headway unless the height is sacrificed for the headway as in the gliding flight.

Very remarkable ability to adapt themselves to the various pressures of the wind is demonstrated by soaring birds such as sea gulls and albatross: to cope with strong winds they reduce the wing surface and angle of incidence until their wings appear like narrow, pointed daggers. When the force of the wind decreases below the critical point, a pressure necessary for sustentation of birds weight with all wing surface effective, birds will lose height or resort to the flapping in order to keep in same elevation.

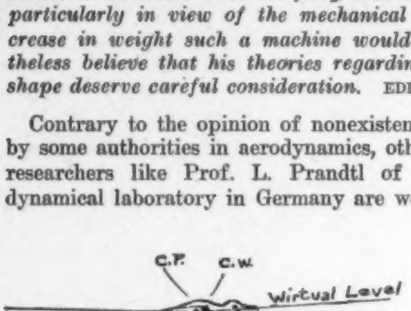


Fig. 1.

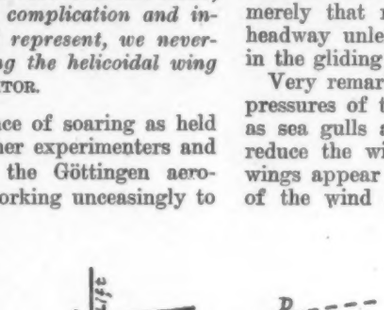


Fig. 2.

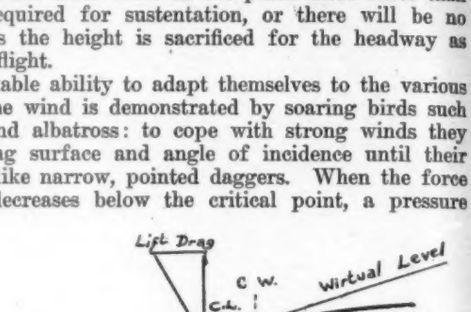


Fig. 3.

How the Birds Soar

That birds take advantage of gravity in order to perform horizontal soaring seems to be proved by the fact that soaring birds automatically adapt their wings to the position required by gravity. Observation of sea gulls riding on top of the masts of ships or poles of ferry-boats discloses the fact that in order to keep up with the speed of a moving vessel, and remain in equilibrium with respect to the relation of gravity and head resistence, these birds do not incline their bodies forward—instead their sense of equilibrium calls their wings into action. Thus, through the action of wings, air pressure is utilized to overcome the dead resistence of the body and compensate for the action of gravity.

In order to keep up with the speed of a moving vessel, gulls unfold their wings just enough to compensate for disturbing forces, some times stretching their wings backward in order to bring the center of weight in front of the center of pressure. Fig. 1 illustrates this condition diagramatically.

When the wings are stretched backward at an angle to the onrushing air, the air pressure acts at right angles to the surface and tends to lift the rear part of the bird, or cause it to gyrate at the point of support *a*, but as the point of support moves forward, this action of the air combined with the action of gravity is transformed into translational motion.

From this it follows that a bird riding upon the mast of a ship does not derive any motion from the ship but depends upon the air pressure, utilizing the mast for support only. This fact is illustrated in Fig. 2. If a surface supported at

B and free to gyrate at *a*, be acted upon by a pressure at *C*, it will take the position *A*; or, if the point of support is free to move, it will take the position shown at *D*. The same effect would be produced were a downward pull exerted through a point located in front of the center of support, as in the case of gravity acting through the advanced center of weight.

Dynamical Soaring

To sustain a surface in the air it is necessary to overcome the downward pull of gravity. This is done by the air pressure supplied by the wind or by moving the plane through the air. But more force is necessary if the plane is to be propelled forward. To overcome gravity an equal force is necessary, and if there are no retarding forces a surface would remain stationary if acted on by wind of sufficient strength and provided the center of lift coincides with the center of gravity. Exerting a supporting force greater than that of gravitational pull would send the surface upward, while less force would bring it down; but if the center of weight is brought way forward of the center of lift, gravity would no longer act through the axis of support, but through the line *D* — *B* in Fig. 3, and this would transform into forward motion that part of the lifting force which exceeds the pull of gravity.

Upon decreasing the force of support the center of weight must be placed rearward of the center of support in order to keep the plane from losing altitude. From this it follows that for a soaring flight a force equal to *AB* plus *AE* is essential. As the lifting force is equal to gravitational pull, it follows that we have available the force *CA* for producing forward motion of the plane, or the force *DA* if we consider the relative gravity as acting through the line *DB*. Apparently wind must possess a lifting force exceeding that of the gravitational pull in order to obtain a forward flight if we consider the retarding forces acting upon a plane. A soaring plane must have high lift and low drift values or the soaring effect would be negligible; at the same time its construction must be such as to permit changing of the center of pressure with respect to the center of gravity, and keep its longitudinal axis horizontal when the center of weight is brought forward by shifting backward the center of lift.

Ordinary fixed surfaces with fixed angle of incidence and center of lift will not do for soaring; they would not be safe on account of the advanced center of weight and on account of the small angle of incidence which is essential in order to have high lift and low drift values, for the lift increases and the drift decreases when the angle of incidence decreases, and vice versa.

The Helicoidal Wing

The most efficient wing appears to be one having the shape of a helicoid or an elongated section of a cylinder, which, being arched shape, starts out from the body in an upward dihedral and terminates in a downward dihedral at the wing

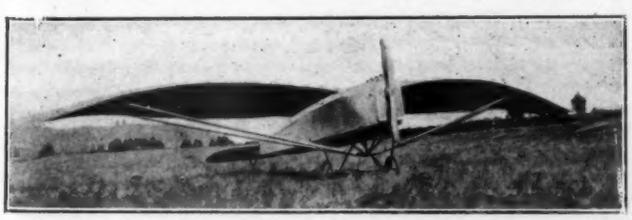


Fig. 4. Soaring airplane embodying helicoidal wings, built by the writer

tip. Fig. 4 shows such a wing form on a machine with which the writer has been experimenting for some time.

The root of the wing, or part close to the body, is in a positive angle while the wing tip is in a negative angle with respect to the horizontal. When acted upon by air, different sections of the wing of this shape present different angles to the line of flight. The relations of these angles, and also the relation of the center of lift to the center of weight, must be changed in order to meet different values of the air pressure.

In a helicoidal wing there are two distinctly inclined surfaces, one inclined upward and the other downward; but to effect soaring, a third surface is essential, namely that of a horizontal stabilizer. A plane of this surface lies between the two planes or diversely inclined sections of the wing. In Fig. 5 *A* represents the upwardly inclined part of the wing, *B* the downwardly inclined and swept back portion of the wing tip, and *C* the elevator or neutralizer for the other two surfaces. The function of the surface *C* is to keep the longitudinal axis of the plane parallel to the direction of air pressure.

The most important feature of the combination of these three surfaces is that it keeps an airplane or a bird parallel

Fig. 5.

Diagram of the helicoidal wing and its "neutralizer" suggested by the writer

to the line of air resistance no matter whether ascending or descending. It is this feature that enables the forward displacement of the center of weight with respect to the center of lift.

Shifting the Wings

To advance the center of weight the center of lift is receded by shifting the wings backward. Each wing is attached to the body in a movable manner along the longitudinal axis so as to increase the angle of incidence when it is moved forward and to decrease said angle when moved backward, increasing the angle of the negatively inclined portion also.

A helicoidal surface has a high lifting value, and if the center of lift is coincident with the center of weight, and the lifting force exceeds the gravitational force, it will cause the flying machine to rise rapidly. As through the sweeping back of the wings the center of lift is receded, and through the advanced center of weight, by the action of gravity, the machine is deviated from the virtual level to that of the true level, and consequently moves forward.

For high speeds the wings are moved backward, thus decreasing the angle of incidence, and are advanced for slow speeds, as in the case of landing or starting.

There are several advantages of the helicoidal wing over that of the ordinary rectangular plane: there is less interference of the deflected air upon the upwardly inclined portion of the wing on account of its upward dihedral, and since there is no leaking of the air around the wing tips the air thus conserved is used to increase lifting and the forward component, thus instead of retarding moments a helpful force is produced.

In a flying machine of good streamlines with a proper wing of helical shape the drift would be negligible and nearly all the force of gravity, exerted through the advanced center of weight, is used to advance it forward.

Description of Wing Shifting Arrangement

A wing of high aspect ratio is movably secured at the roots, Fig. 4. The construction there is such as to permit lowering the trailing edge when the wing is moved forward, and raising it when moved backward, the angle of incidence being increased or decreased respectively. This movement is obtained by an upward standard movably connected at one end to the trailing spar of the wing and at the other end to a point in the floor of the body; free to swing in a lateral direction, the upward end of this piece describes a portion of an arc of a circle.

The wing supporting braces are fixed at one end at points near the wing tips, while the other ends are movably attached to points below the body, in the vertical of the roots. In order to change the angle of incidence the forward brace is journaled at a point in advance of the other brace so that when the wing is moved forward this tends to lift the leading edge of the wing and depress the trailing edge.

For actuating the wings two cables are provided for each wing which at the same time act as drift cables. The cables run over pulleys and then around a drum on the steering column in opposite directions, so that, when the steering wheel

is rotated to the right the first cable is tightened while the second cable is loosened, which moves the wing forward. The reverse takes place when the steering wheel is rotated to the left. Cables from the other wing work upon the same drum but in opposite manner, so that when one wing is advanced the other one is retarded.

In order to move both wings at the same time, the steering column, which is journaled at its point of attachment, is moved forward or backward by the pilot, or this can be actuated by springs, or preferably by compressed air.

With the helicoidal shape of the wing is embodied a dihedral angle. This dihedral has been regarded as detrimental to the stability of airplanes—but this instability effects only static stability, and not dynamical stability.

Statically stable planes are not always dynamically stable, but the writer is of the opinion that it is not static stability we want, but dynamical. The helicoidal wing with its upward dihedral in a machine of low center of weight increases dynamical stability or automatic controllability, for dynamic stability is dependent upon all the forces acting upon a moving body, whereas static stability is only concerned with the forces acting upon a stationary body. Stationary models, when acted upon by the air, act in a most unstable manner, while in free flight they show high stability and remarkable self rightening power. When coming to earth such models, instead of crashing down, parachute down.

While a shifting wing machine presents some difficulties from the engineering point of view, the writer believes that the advantages to be derived from the variation in incidence and effective wing area, in conjunction with displacement of the center of pressure with respect to the center of weight, more than compensate constructional drawbacks.

The Commercial Operation of Flying Boats

Maj. B. L. Smith, Traffic Manager of the Aeromarine Airways addressed the luncheon of aeronautical executives at the Cafe Boulevard, New York, on June 9. The subject of his talk were the practical matters which have come up in connection with the flying boat operations of his company during the past two years. To date Aeromarine flying boats in commercial service have operated 2100 hr. in the air. During the first year's regular operations, breakage cost in getting in and out of harbors, bumping docks and floats, etc. was a serious item. However, during the past year's operations (1921-22), due to greater experience and more efficient ground organization breakage was reduced to almost zero, only one wing pontoon having been damaged, although these boats in their operations in southern waters had to take off and land in seas from three to five feet high. One F5L, the Ponce de Leon, was in regular daily operation without interruption for two months and during this time this ship made a round trip every three days between Key West and Havana. One of the other F5L's was operated over 200 hr. without any overhaul or repairs being necessary.

The excellent operating results attained by these ships was attributed by Major Smith to the fact that they have been reenforced and strenghtened by his company. The flooring placed in the ships acts as a double bottom of cantilever construction and greatly strengthens the hull. Other changes have been the re-design of the rib construction of the lower wing to prevent breakage from the heavy seas which these ships frequently encounter in taking off and landing.

Operation and Upkeep

Another ship of the fleet, the Santa Maria, was in continuous operation for nine months without requiring any overhaul. In this period there was included the flight from Havana, up the coast, through the Great Lakes, down the Mississippi and back to Havana. Another instance of low maintenance expense was that of the F5L Columbus which had 350 hr. flying time with only $100 maintenance expense.

Major Smith emphasized that these low maintenance costs were attained in flying the ships to full capacity with an average of ten passengers, baggage, and 350 gal. of gasoline, and that the ships after their long operating experience were just as responsive in taking off as they were the day they were placed in service.

While the cost of maintenance of the smaller HSL type of boats is higher than the F5L's, these ships, Major Smith stated, are still able to get off with full loads. He pointed out as well, that the wear and tear was due exclusively to causes incidental to operating rather than to accidents. The life of these ships has been variously estimated at 300 to 1000 hr. but there were as yet no real signs of deterioration, and the only way their actual life could be determined would be by continued experience.

Major Smith added his praise to the well known efficiency of the Liberty engine. In 735 hr. the engines of two ships were in the air, they had only two forced landings, of which only one was actually due to engine trouble, while two flights were cancelled on account of bad weather. Altogether their Liberty engines have operated 2100 flying hours, 300 hr. in the air being the usual time allowed before overhaul.

Theory vs. Practice

Major Smith thought that many of the writers on air traffic were off the track. The engineers are said to be waiting for more efficient planes, while the designers are waiting for more efficient engines with lower fuel consumption. In his opinion it is not so much a question of material and equipment as it is of traffic. If the interest of the public in air travel could be secured, there would be no question of making big money with the present equipment. He pointed out that the figure of merit allowed the F5L by one writer is 1925, while the figure of merit for the Vimy Bomber is 4595, more than 50 per cent greater. While both machines carry the same fuel load and have the same power, the only difference is in their speed which is 85 m.p.h. for the F5L and 110 m.p.h. for the Vimy. He was of the opinion that the F5L had demonstrated that it was the most economical machine in operation today.

On the question of speed for their latest flying boats the English specifications call for 100 m.p.h. In Major Smith's opinion however, a flying boat which averages 70 m.p.h. is doing very well compared with the average railroad speed of 45 m.p.h. He thought that the present biplane wing construction was quite efficient for commercial flying operations as, in his experience, where monoplane construction gave higher speed it also increased the take off and landing speeds which is a great objection in ships that are operating as a rule in rough waters around the coasts.

Lack of knowledge on the part of the public of the actual safety of flying boat travel was the greatest handicap they encountered, Major Smith declared. They were making every effort to overcome this, but when enthusiasts suggested advertising on a large scale in newspapers and national magazines they did not take into account the enormous expense which could not be underwritten by any one operating company. The speaker felt however that his company had practically overcome all operating handicaps; that the service had clearly demonstrated its practicability; and that it would only be short time before the public could be made to see these facts, if the newspapers would cooperate with publicity on the theory of building up aviation facilities and equipment for national defense.

Beginning July 1, Aeromarine Airways will operate a daily flying boat service between New York and Atlantic City for a period of at least thirty days, regardless of whether full loads are carried or not. A ship will leave the company's airport in New York at 82nd Street and Hudson River at 4 p. m., with the return trip from Atlantic City starting at 10 a. m. each morning. The success of this service for July will determine whether it will be continued regularly.

Regarding a U. S. Academy of Aeronautics

Secretaries of War and Navy Report to Senate On Practicability of Creating Aerial Academy

In response to Senate Resolution of April 5, 1922, introduced by Senator Walsh of Massachusetts, and directing the Secretaries of War and of the Navy to report among others on the feasibility of establishing a U. S. Academy of Aeronautics, the Senate has received the letters printed below. Editorial comment of these two letters appears on the editorial page.

The War Department's Letter

WAR DEPARTMENT
Washington, May 17, 1922.

THE PRESIDENT OF THE SENATE,
Washington, D. C.

Sir: In response to Senate Resolution No. 266, directing the Secretary of War to report to Congress (1) whether or not it is feasible and advisable to establish a school of aeronautics, to be known as the United States Academy for Aeronautics, with buildings, grounds, and equipment necessary for instructing and training cadets; (2) whether or not it is practicable to use a part of the buildings and grounds of the United States Military Academy and of the United States Naval Academy for separate schools in aeronautics, to the end that young men desirous of qualifying for commissions in the United States Air Service may be appointed as cadets to such separate aeronautical schools in the same manner as cadets are now appointed to qualify for commissions in the United States Army and the United States Navy; and (3) whether or not it is feasible to take over one of the existing Naval Yards or Arsenals for the purpose of converting the same into a Government plant for the development and manufacture of aircraft of various kind, suitable for national, commercial and defense purposes; by direction of the President I transmit to you the following information.

(1) It is feasible to establish a school of aeronautics to be known as the United States Academy of Aeronautics, with buildings, grounds, and equipment necessary for instructing cadets, provided (a) that such institution is authorized by law (b) that its establishment and maintenance is made the duty of an authorized governmental agency with sufficient personnel and (c) that proper appropriations for its establishment and maintenance are made by Congress.

However, it is not considered advisable to establish such a school, since the War Department already provides for the instruction and training of fliers in the military service and other governmental agencies make similar provision for their services. Schools for fliers are now maintained by the Army as follows: Primary flying school, pursuit school, bombardment school, attack school, observation school, communications school, photographic school, mechanics school, engineering school.

Their courses are suitable and are producing trained fliers in adequate numbers. Some consolidations of schools and improvement in courses are contemplated. The existing plants can easily be expanded to handle any desirable number of students.

(2) It is not practicable to use a part of the buildings and grounds of the United States Military Academy for a separate school in aeronautics to the end that young men desirous of qualifying for commissions in the United States Air Service may be appointed as cadets to such separate aeronautical school in the same manner as cadets are now appointed to qualify for commissions in the United States Army and the United States Navy. Such a use would involve greatly curtailing the activities of the United States Military Academy. The mission of the United States Military Academy is: To so develop the powers of analysis that the mind may reason to a logical conclusion; to install discipline and a high sense of honor; to bring its graduates to the threshold of their profession properly equipped to pursue its study.

The buildings and grounds of the United States Military Academy are not entirely sufficient for the carrying out of its present mission, and could not be diverted to other uses without corresponding loss of efficiency in the United States Military Academy. In addition neither the buildings nor grounds are suitable for a school of aeronautics. Large expenses in remodeling, new construction, and acquisition of additional grounds would be necessary if a separate school of aeronautics should be superimposed on the United States Military Academy.

In this connection, it is noted that the purpose of the proposed school is to qualify young men for commissions in a United States Air Service. Such an organization does not exist, and this department has heretofore expressed the opinion that it should not be called into existence. The Air Service of the United States Army, as prescribed in the act of June 1920, is sufficient for military purposes.

(3) It is feasible to take over one of the existing arsenals for the purpose of converting the same into a Government plant for the development and manufacture of aircraft of various kinds, suitable for national, commercial, and defense purposes, subject to the provisions laid down in paragraph 1. It should be noted, however, that such action would involve complete loss of the arsenal as such, while the plant would not be suitable for the development and manufacture of aircraft without complete remodeling.

Respectfully,
JOHN W. WEEKS,
Secretary of War

The Navy Department's Letter

NAVY DEPARTMENT
Washington, May 27, 1922

THE PRESIDENT OF THE SENATE,
Washington, D. C.

MY DEAR MR. PRESIDENT: Replying further to the letter of April 6, 1922, from the Assistant Secretary of the Senate, inclosing Senate Resolution 266, directing the Secretary of the Navy to report to Congress (1) whether or not it is feasible and advisable to establish a school of aeronautics, to be known as the United States Academy for Aeronautics, with buildings, grounds, and equipment necessary for instructing and training cadets; (2) whether or not it is practicable to use a part of the buildings and grounds of the United States Naval Academy for a separate school in aeronautics to the end that young men desirous of qualifying for commissions in the United States Air Service may be appointed as cadets to such separate aeronautical school in the same manner as cadets are now appointed to qualify for commissions in the United States Navy; and (3) whether or not it is feasible to take over one of the existing Navy yards for the purpose of converting the same into a Government plant for the development and manufacture of aircraft of various kinds, suitable for national, commercial, and defense purposes, I have the honor to inform you as follows:

Naval training and qualifications are so closely woven into those attributes which make a successful naval aviator, that to divorce his schooling from the direct naval associations into a separate air-training establishment, is considered most detrimental to the Navy's interests and to the purpose for which the Navy equips its aviators. An efficient naval officer must be thoroughly trained in all naval subjects, including ordnance, gunnery, scouting, tactics, types of ships, tactical movements of the fleets and their units, customs of the sea, etc. He must be conversant with the problems of the officers

and men who direct and handle the surface naval ships. His duties, which are, and will continue to be, closely associated with the tactics and strategy of the fleet and its various units, require an intimate knowledge of the sea, of naval conditions, and of naval warfare.

The actual piloting and maneuvering of a plane represents only a small element of the work and experience required of him. The close cooperation required between battleships, cruisers, submarines, destroyers, and the Air Force will require a knowledge which can be gained only by service connected with all the various elements which go to make up the Navy.

Upon this basis the Navy's system of training aviation officers consists of taking officers who have had three years' sea service and who are, as far as practicable graduates of the Naval academy. The midshipman gets a theoretical course in aeronautics at the Naval Academy but until he receives actual training in flying he is of little practical value. For this reason, the graduate who is selected for aviation after his three years' sea service is trained in aeronautics and actual flying at the Navy's flying school at Pensacola, Fla. After a successful six months' course at Pensacola, he is sent to sea in an aviation capacity and if, after a year's sea service in aviation, he proves himself capable of combining his flying ability with his qualifications as a naval officer he is given his designation as a naval aviator. It will thus be seen that a qualified officer pilot in naval aviation is given seven years' naval training and at least six months' training in actual flying.

A limited number of experienced and apt enlisted men are taken into naval aviation as second pilots after a course of six months training at the flying school at Pensacola. This course consists of ground work, actual flying, and training in gunnery, aerial navigation and bombing, and kindred subjects.

Technicians necessary for naval aviation are as a rule secured by cooperation with the Bureau of Construction and Repair and the Bureau of Engineering of this department. In addition a number of naval aviators take a special post-graduate course each year at the Naval Academy with the idea of completing their general instruction in aeronautical engineering at the Massachusetts Institute of Technology. It will be observed, therefore, that what the Navy requires most in the training of aviation personnel is best taken care of by the Navy itself in its own operating schools and systems of instruction.

The establishment of an academy of aeronautics would not give the Navy the product it desires or must have. In foreign countries, including Great Britain, where aviation has been fostered to any extent, it has been found that the naval aviator, in order to be useful, at sea or in connection with ships, must have a thorough naval training and additional means have been provided to this end.

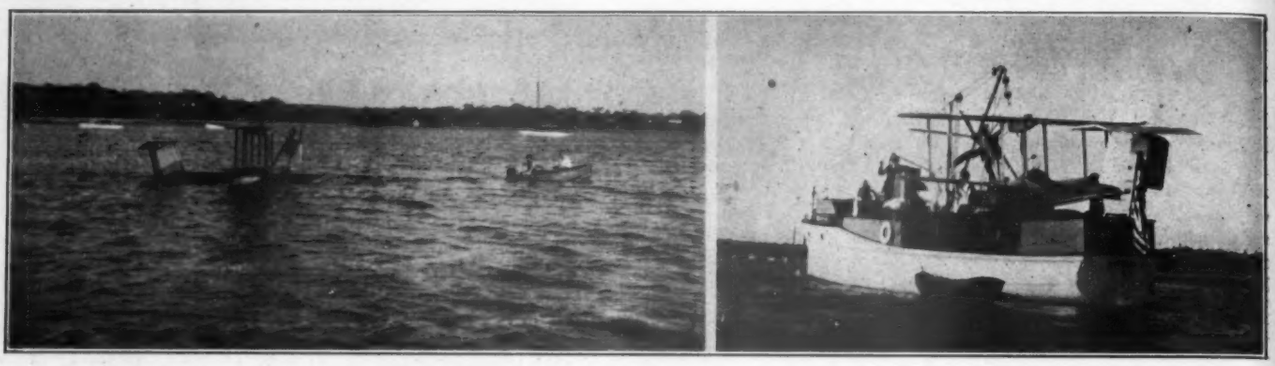
The primary mission for the establishment of an academy of aeronautics undoubtedly would be the technical aviation training of its students. There are now in operation several first-class colleges which have excellent courses for those desirous of studying aeronautical engineering and taking practical flight training. The personnel which can be obtained from these colleges serve equally as well for naval aviators as the young men who would obtain commissions from the proposed academy of aeronautics, and it is therefore not deemed necessary for the Government to incur the expense of establishing and operating the proposed academy of aeronautics.

The conversion of a navy yard into a Government plant for the development and manufacture of aircraft is also considered unnecessary and inadvisable. The naval aircraft factory at Philadelphia has a capacity so large that it might be overtaxed only in case of war. At such a time no one plant could handle the supply of aircraft that would be needed. To build up a plant adequate for all the aircraft needs of the Government would tend to stifle the civil aviation industries of the country, which might prove to be a serious mistake, as the civil aviation industry is the only agency that can be expanded to the extent that would be required in time of war.

Furthermore, it has been the department's policy to employ the naval aircraft factory at Philadelphia for only such an amount of production work as would constitute a check upon the actual costs of production. Cooperation with, rather than competition against, the civil aviation industry, has been the rule. The establishment of another Government aircraft factory in place of a navy yard would render the present naval aircraft factory at Philadelphia unnecessary and would constitute a useless expenditure of Government funds. This situation appears to have been taken cognizance of by Congress in the passage of recent appropriation acts containing a provision in the following language:

"*Provided,* That no part of this appropriation shall be used for the construction of a factory for the manufacture of airplanes."

Sincerely yours,
THEODORE ROOSEVELT,
Acting Secretary of the Navy



Left: small tractor flying boat built by the Loening company for testing various hull and tail arrangements which were later incorporated in the Loening Air Yacht—Right: the flying boat resting on the motor yacht Argus, Jr., which is probably the smallest aircraft carrier in existence

Current Air Appropriations

	Allowed in budget	*House*	*Senate*
Navy Bill H.R. 11228	$17,043,310	$ 7,866,950	(*)
Army Bill H.R. 10871	15,210,770	12,431,000	13,000,000 †
Air Mail H.R. 9859	2,200,000	1,900,000	1,900,000
Nat'l Adv. Comm. Aero H.R. 9981	250,000	210,000	210,000

* The Navy Bill was reported by the Senate Committee June 10, 1922. This Report raised the appropriations for aircraft to $14,703,950.

† Still under discussion. The helium appropriation has been cut from $400,000 to $300,000.

No appropriation bill has been signed as yet by the President. The Army and Navy bills are being held up in the Senate on account of the tariff bill. The other bills are either in conference committees or the conference reports of these committees are waiting approval of Congress before going to the President.

Air Service Tests New Instruments

Rate of Climb Indicator, Bubble Statoscopes And New Barograph Tested in Balloon Flights

By S. R. Winters

A free balloon flight was recently undertaken by the Engineering Division, Air Service, at McCook Field, Ohio, for the special purpose of testing a series of five aircraft instruments, three of which were given trial demonstrations. Greater sensitivity of mechanical units installed on airplanes for revealing changes in altitude, variation in atmospheric pressure, and the rate of ascension, is the desired objective of designers of new aircraft instruments. A statoscope, a barograph, and an automatic rate-of-climb indicator were among the extremely sensitive instruments installed for test during this free balloon flight.

The statoscope, an instrument for recording the change in altitude of a balloon, consists of a chamber insulated with felt, to which is affixed a capillary tube or one whose opening is as fine as a hair. This is partly filled with a colored liquid which is not subject to freezing nor evaporation. As the aircraft goes higher in the atmosphere there is experienced a change in the density of the air. This condition invites an expansion of the atmosphere in the chamber of the statoscope. The expanded air passes through the hair-like tube referred to, resulting in the column of colored liquid moving to a point on the instrument labeled "Ascend." Similarly, a reduction in the height attained is responsible for the liquid moving to a point designated by the word "Descend."

The particular design of statoscope given a trial demonstration by the Air Service (Fig. 2) had been previously calibrated. When the column of colored liquid changed its position to the extent of bursting the bubble, it was taken as an indication of a rise or fall of twenty feet. A chart was drawn up which permitted of the use of this instrument as a rate-of-climb indicator.

The katanoscope, (Fig. 1), an instrument of French design and employed as a rate-of-climb indicator, is also to be adapted to the needs of American aircraft in its search for apparatus of extreme sensitivity. This automatic katanoscope functions in accordance with the principle that in ascending the pressure of the atmosphere decreases while the reverse is true when descending. The variations of the position of a needle on the instrument reflects the speed with which aircraft rises or falls with respect to the surrounding atmosphere. A clock-like mechanism actuates this needle with such preciseness as to show at intervals of five seconds the relative rate of ascension or descension of an air-going machine. When the katanoscope is conveyed upward the air in its sealed chamber expands and stretches a diaphragm across that chamber. The degree of elasticity of this diaphragm is translated by the needle referred to. At the conclusion of five-second intervals, the change of pressure is relieved by the clock-like mechanism opening a valve leading to the air chamber. The pressure on the diaphragm is released, and the needle returns to a zero position. Forthwith the valve is closed automatically, barring the entrance to the atmospheric chamber. Any subsequent variation in air-pressure is again revealed by the needle.

The barograph recently tested by the Air Service shows a graphic change in atmospheric pressure or altitude. This

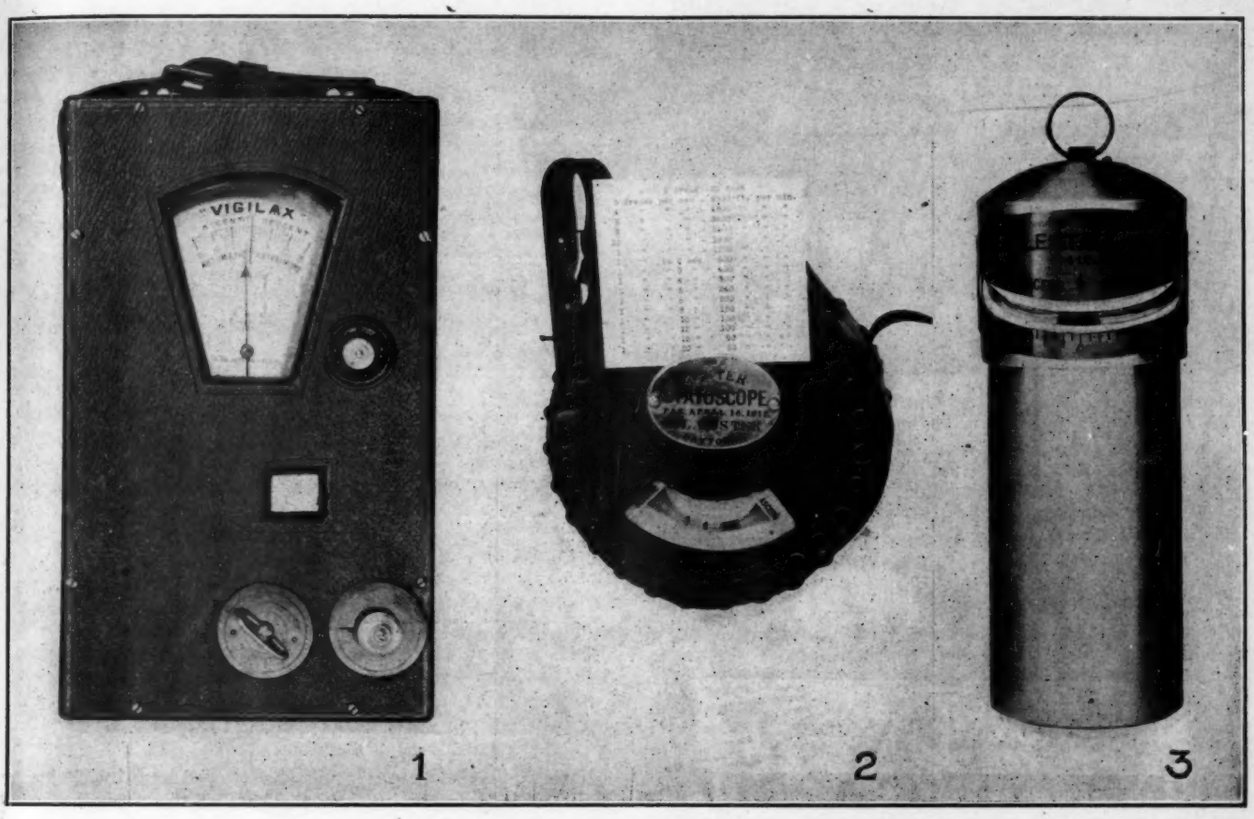


Fig. 1. The Hüe Katanoscope (rate of climb indicator)—Fig. 2. The Custer bubble statoscope—Fig. 3. The British Wright bubble statoscope

instrument is comprised of one or more partially evacuated cells, whose thickness varies with a change in atmospheric pressure. This results in a certain degree of movement. The latter is greatly magnified and is translated by a pen that sketches a corresponding line on a revolving drum.

A type of altimeter adopted as standard equipment by the Air Service of the United States Army was also employed in this free balloon race. The instrument consists of a partly evacuated chamber, the construction of which is such that its thickness varies with a reduction in pressure, or upon rising, the chamber becomes correspondingly thicker. This movement is translated by a needle which indicates a corresponding but greatly magnified action on a circular dial.

Another type of statoscope, of English design, (Fig. 3), tested out during this free balloon flight did not prove to be as sensitive as the design described in a preceding paragraph of this article. This instrument has an air chamber with one end open. A hair-like tube, containing a small quantity of a colored liquid, is attached to the open end of the chamber. The latter consists of a double-walled vacuum vessel.

Round the World Flight

Maj. Wilfred Blake, Capt. Norman MacMillan and Lieut.-Col. L. E. Broome, started on May 24 from Croydon airdrome on an attempted 30,000 mile airplane flight around the world. The three aviators made their start in a DH9 airplane capable of making 115 m.p.h. It carries 672 lb. of baggage, has the latest equipment for comfort, and special attention has been paid to the gasoline systems.

Our British contemporary *Flight*, in its issue of May 11, made the following editorial comment on this projected flight:

"The Aircraft Disposals Co. has, with commendable sporting spirit, placed four machines at their (the aviators') disposal, and the project appears to give fair promise of success. The machines to be used, although not of new types, have stood the test of time and, given reasonable luck, the aviators should have a very good chance of getting through. Although as a sporting effort the use of a single machine for the entire flight would have been more spectacular, the employment of four machines, of three different types, will be a much closer representation of the actual conditions which will obtain when we come to run really long-distance services, and from that point of view is, perhaps, of even greater practical value. The Rolls-Royce and Siddeley "Puma" engines have both proved themselves thoroughly reliable on many long-distance flights and the deHaviland and Fairey machines are equally famed for their excellent qualities. We must confess that, personally, we should have liked to see a different machine than the F-type flying boat for the last stage, as there are several which would, in our opinion, be more suitable for the work. Time does not, however, allow of getting a new machine built in time, unless the Air Ministry could be persuaded to lend one, and the F boat is the nearest approach to the ideal machine wanted. Except for unforseen accidents, the venture should succeed."

The manner in which it is intended to use the various machines is as follows: The aviators hope to get as far as Calcutta, India, with the DH9, their first machine, traversing the ordinary route to India by way of Paris, Rome, Athens, Crete, Alexandria, Bagdad, Bazra, Karachi and Delhi, approximately 7000 miles. On the next stage the use of a Fairey FIII seaplane has been planned. In this machine, fitted with a 360 hp. Rolls-Royce engine, the airmen would fly from Calcutta and proceed via Rangoon, Bangkok, Saigon and along the Chinese coast to Japan, Yokohama, and then to Petropavolsk, and along the Aleutian Islands and the Alaskan coast to Vancouver. At Vancouver the plan calls for a change into another DH9 machine across Canada, to Chicago, and thence to New York. Using this machine to Newfoundland, the airmen propose taking up their fourth machine, an F3 flying boat with two 360 hp. Rolls-Royce engines, and flying on this machine across Greenland, Iceland and the Faroe Islands to Scotland, land at Aberdeen.

Major Blake has estimated that with average luck he could get around the world in three months.

Can the "Petrel" be Spun?

Is the Huff-Daland Petrel, which is now under test at McCook Field, by the Engineering Division, Air Service, so balanced and designed that a tailspin is impossible? This question has come up during the tests, in view of the fact that no pilot has been able to make the plane spin. This may be due to the center of pressure travel on the Göttingen 387 wing.

The plane has been flown by Captain McCready, by Captain Mosely, by Art Smith, by Meister and by Pat Moriarity, for the Army, and by George B. Post, for Huff, Daland and Co., its manufacturers. It has been looped and rolled. It has been flown in mimic combat by Pat Moriarity against the Vought, and has been placed in nearly every conceivable position. But no one has been able to make the plane spin.

All the pilots who have flown it have reported enthusiastically concerning its maneuverability and ease of control over a speed range of nearly sixty miles. It is quite sensitive to all controls, and very easily and quickly turned. But, evidently, the plane will not spin. When placed in a position where it should stall, with the controls so placed as to drop the plane "into it," the Petrel seems to fall off its lower wing in a side slip, from which it will emerge in a dive if let alone. Further information on this feature of the plane will be very interesting, in view of the efforts which have been made to design a plane which cannot fall in a tailspin.

Canadian Technical Memoranda

The Air Board of Canada has made public the following additional technical memoranda:

Wiring of Drain Plugs

All drain plugs must be adequately secured from rotation by wiring to some adjacent fixture. This applies to drain plugs or cocks in the bottom of radiators, drain plugs or cocks in the base of oil pumps, drain plugs or cocks in the base of water pumps, drain plugs or cocks in water or oil pipes, etc.

Air Station Superintendents are to take precautions to see that all drain plugs and cocks on machines at their Stations are adequately secured and that the personnel understand the importance of replacing the wiring after these parts have been opened.

Re-Balancing of Propellers after Re-Tipping or Re-Painting

Ground engineers are reminded that when propellers are re-tipped or even re-painted, it is essential that they be properly re-balanced before being replaced on aircraft.

Such re-balancing can easily be carried out by fitting a metal or hard-wood plug into the boss of the propeller, such plug carrying a 1-in. diameter steel spindle, which is in turn supported by two steel knife edges. The propeller should be balanced while under test by the application of additional paint or varnish as may be necessary.

War Department and Civil Aviation

Recognition of the fact that civil aviation and an aircraft industry are necessary to adequate national security and to the proper expansion of commerce, was recently acknowledged by Secretary of War Weeks in the following statement:

"The War Department has adopted a policy of co-operation with commercial bodies and organizations to encourage civilian aviation.

"To aid competition in the manufacture of airplane material, the department has distributed its orders for machines and equipment among as many manufacturers as possible, believing that this policy would be conducive to keener interest in perfecting machines and in building up a greater number of establishments capable of turning out machines in time of emergency.

"Particular efforts had been made to encourage the establishment of landing fields in all parts of the country, lack of them having proved a distinct handicap to military aviation."

ARMY AND NAVY AIR NEWS

Air Service

Citation for Heroic Conduct—By order of the Secretary of War General John J. Pershing, Chief of Staff, has awarded the following citation for heroic conduct in connection with the Roma accident:

"Harry A. Chapman, R-1064877, master sergeant, Airship Co. No. 19. For heroism during the Roma disaster near Norfolk, Va., Feb. 21, 1922. Sergeant Chapman was caught in the wreckage of the airship and after cutting an opening in the burning canvas, although severely burned, he remained at the risk of his life to rescue four others near him, thereby saving their lives."

* * *

Army Orders—Maj. Leslie MacDill, A.S., relieved from further duty as student officer at Mass. Inst. Tech., is assigned to duty at McCook Field, Ohio.

Maj. Henry L. Watson, A.S., relieved from further duty at McCook Field, Ohio, is assigned as commanding officer to Mather Field, Calif.

W. D. Order assigning Capt. Lawrence P. Hickey, A.S., to Post Field, Okla., is amended to read "to Chanute Field, Ill."

First Lieuts. Harlan T. McCormick and William L. Wheeler, A.S., relieved from duty as students at Kelly Field, Tex., have been assigned to Kelly Field for permanent duty.

W. D. Orders assigning Capt. Clinton E. Fenters, Inf., Capt. Joshua D. Powers, Inf., Capt. Truman E. Boudinot, Cav., and First Lieut. Cornelius E. O'Connor, Inf., to Carlstrom Field, Fla., for duty and pilot training are amended to read to "Brooks Field, Tex."

Capt. Harold B. Gibson, Cav., relieved from further duty in the Philippine Islands, is assigned to station at Brooks Field, Tex., and detailed in the Air Service.

First Lieut. William H. Bleakley, A.S., relieved from duty at Carlstrom Field, Fla., is assigned to Aberdeen Proving Grounds for duty.

* * *

Post Field—In compliance with instructions from the Chief of Air Service regarding elimination flights for the National Balloon Race a free balloon flight was started from Post Field, Okla., on May 6. After securing the wind aloft from the meteorological station at this post, a course of flight was mapped out, and the altitude of flight, time in air and place of landing predicted before flight. There was meteorological data available from any other station for several weeks past, and the local conditions proved all wrong. On the morning of the flight the wind aloft indicated a west-southwest wind of from 40 to 55 m.p.h. intensity at from 2000 to 4000 ft., but at no time during flight, even at the start, were winds of these intensities encountered. It was predicted that a landing would be effected two and one-half hours from time of starting at Chrisney, Okla., a distance of 88 miles from station.

Capt. William B. Mayer, A.S., was pilot, and Master Sergeant William J. Mansfield, aide. A 35,000 cu. ft. balloon was used. Captain Mayer's story of the flight is as follows:

At 9.30 a. m., the balloon took off, and the manner of our going was in accordance with our predictions in everything but speed. We lost one-half hour at Acme, Okla., a distance of 23 miles. We were due to arrive at this place at 10 a. m., but arrived at 10.30. A half hour later we became stationary, started south and southwest, which course would have taken us back to the starting point. This was not in accordance with our predictions, so we proceeded up and down in elevator fashion until an altitude was found at 9000 ft. in which we could proceed in a manner on our course. Up to this time there was not a cloud in the sky, and there was no way of telling the wind aloft without ascending in those altitudes.

"All this maneuvering caused considerable delay, and our next city of approach, Bradley, Okla., was not passed until 12.15, 1 hr. 40 min. after scheduled time. About this time an approaching storm was encountered, attended by many clouds, so many, in fact, as to entirely obstruct our view of the terrain. The tops of these clouds were at an altitude of 5000 ft., but it was impossible to travel with or below them, inasmuch as they were proceeding in the direction of home with much gusto. At intervals during the next hour patches of the ground could be observed, and at one o'clock the Canadian River was crossed, 15 miles north of our predicted crossing, and 1 hr. 50 min. behind time. After traveling another hour without sight of land, we decided to go down and get our bearings. At 4000 ft. we located ourselves 20 miles south of Oklahoma City. We were traveling southwest and headed for the Canadian River. A strong northeast ground wind was blowing, and we decided to strike for higher altitudes again and maneuver around the city. We therefore proceeded to ascend. All winds below the altitude of 10,000 ft. were blowing west, and at 10,000 ft. we were sitting on the top of a white world.

"At 2.30 p. m. we again descended and found ourselves northeast of Oklahoma City, and in spite of a twenty-mile northeast wind, we effected a beautiful rip landing, 8½ miles southeast of the city, at 3.07 p. m., in a meadow, without so much as overturning the basket. For the information of those who think a landing in a strong wind cannot be effected without spilling the basket and its contents, be advised that if the anchor rope be suspended from the top of the basket on the same side as the drag rope and rip panel, the basket will not turn over if the anchor holds—and the anchor held. We did not land, however, where we predicted nor at the scheduled time. Oklahoma City is thirty miles north and twenty miles west of Chrisney. The temperature at the higher altitudes was 105 deg. and, it is needless to say, we were cooked from our sojourn above the clouds."

* * *

Montgomery Air Intermediate Depot—Maj. William J. Fitzmaurice, Air Service, who has been in command of the Montgomery Air Intermediate Depot since October, 1920, has been retired from active duty with the Army, and will be succeeded in command by Maj. Roy S. Brown, commanding officer of the 22nd Squadron.

Major Fitzmaurice began his military career upon entrance to West Point Military Academy in 1904. He graduated therefrom in 1908, and was appointed a 2nd Lieutenant of Infantry. During his eighteen years of service he has filled many important positions of responsibility. He saw foreign service in Alaska Panama, France and Germany. It was while on duty in Germany that he met with a most severe and painful accident, which caused his physical disability and consequent retirement. A rifle he was using exploded, and particles of steel entered his right eye.

The last official ceremony, in which Major Fitzmaurice reviewed the officers and troops in his command, was held on the morning of May 2. He addressed the men, expressing his satisfaction and appreciation of the cooperation from officers and men that has made the 22nd Squadron and the 4th Photo Section successful.

Major Fitzmaurice intends to make his home in Los Angeles, Calif., where his parents now reside.

22nd Squadron Observation—An official report covering the operations of the 22nd Squadron (Observation) stationed at the Air Intermediate Depot at Montgomery, Alabama, during a period of six months from Nov. 4, 1921, to May 4, 1922, shows that excellent progress has been made. Among the various achievements of this squadron during the above period particular mention may be made of the fact that a total of 1364 flights were made for a total duration of 448.20 hr., with but one wreck, this being a plane returning from a cross country trip from Birmingham, Ala., which was forced down through inclement weather in a poor landing field. No injuries resulted to either pilot or passenger, and the plane was subsequently repaired and flown to its home station.

During this period the squadron has successfully handled seventeen Infantry contact missions with the Infantry School at Camp Benning, Ga. Fifty-five members of the Field Officers' Class, seventy-nine of the Company Commanders' Class and forty-six of the Basic Class were given reconnaissance flights, making a total of 180 students of Camp Benning, Ga., who took advantage of this opportunity.

During the last two weeks of February, two officers and ten enlisted men of the Communication Detail, 29th Infantry, Camp Benning, Ga., were ordered on temporary duty to the Montgomery Air Intermediate Depot, where they were given a course of training by the radio department of this Squadron in aerial communication. Numerous test flights and special tests, as outlined by the experimental department of the Infantry School, were conducted.

The strength of the squadron is ten officers (eight pilots and two observers) and ninety enlisted men.

Bombing flights have but recently been started, due to the fact that no ground is available at this depot for this training. Arrangements were recently made with the Infantry School, Camp Benning, Ga., whereby the squadron will use one of their many target ranges for this training.

* * *

Fairfield Air Intermediate Depot—The engineering department at the Fairfield Air Intermediate Depot, Fairfield, Ohio, has completed the conversion of a JN6H airplane into an ambulance airplane.

The take off is unusually long, due to the excess weight, but the ship handles well in the air, though not as sensitive to the controls as the standard type. The unusual feature of this type of ambulance airplane is the location of the physician and the litter. By means of a window, the physician can observe the patient at all times. The litter is easily accessible and can be removed from either side of the fuselage. A special compartment constructed in the fuselage takes care of the first aid kit, instruments or medicines.

The plane is equipped with a standard 31-gal. capacity tank, with an approximate flying radius of 200 miles. It has a flying speed of from 50 to 65 m.p.h., and a landing speed of from 30 to 40 m.p.h., depending upon the load. As no altitude flight has been made, its maximum altitude cannot be given at this time.

Airdrome Program for Reserve Fliers—A federally controlled airdrome program including flying fields and hangars and shops, as well as planes, for at least eight cities in this country has just been approved by the War Department. Present plans provide for the establishment of flying fields at Boston, Pittsburgh, Baltimore, Columbus, Chicago, Kansas City, Denver and Los Angeles, where representatives of the War Departments are already negotiating for the leasing of suitable land at a nominal sum.

While no appropriations have been made for the purchase or rental of land, it being hoped that municipalities and public interest will cooperate in making the land available, appropriations of from $12,000 to $15,000 have been alloted for each project, to include the erection of shops, hangars and gas tanks.

The airdromes will be maintained chiefly for the training of organized Air Service Reserves and officers of the Reserve Corps, who are now permitted to fly if qualified at Army fields, as well as the training of National Guard units. Commercial concerns will be permitted to conduct flying operations from these airdromes, it is said, but will have to provide their own hangars and shops, and comply with Air Service regulations.

The Army will supply a number of training airplanes to each airdrome for the use of reserve officers. As soon as the Corps Area Commanders complete their leases for suitable land, it is the intention of the Air Service supply department to ship hangars and available planes to the sites. There will be an officer of the Air Service in command of each field, assisted by six or eight civilians, as mechanics and riggers, there being no provision for enlisted personnel.

In Denver the field under consideration was formerly used as a flying field by a private air navigation company.

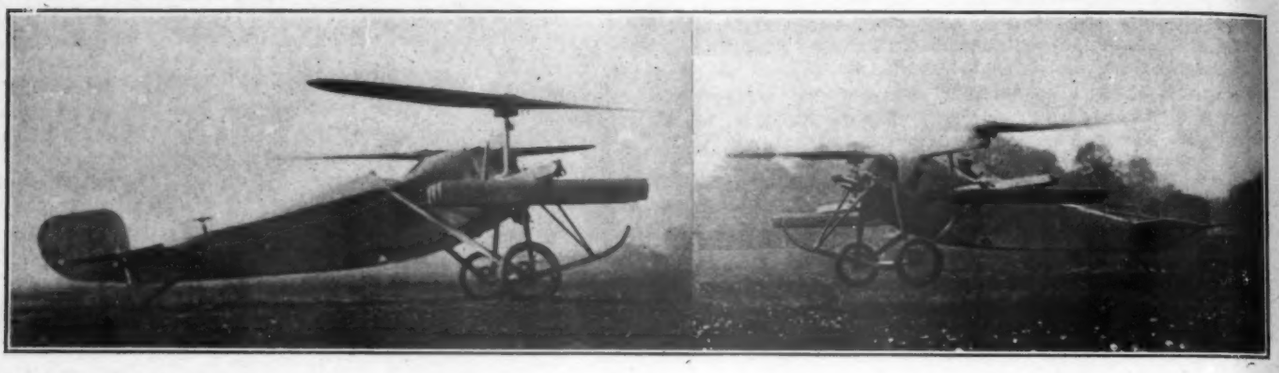


Photo International

Henry Berliner's latest helicopter, on the ground and "lifting off," which was demonstrated last week at College Park, Md., to a naval technical commission headed by Comdr. J. C. Hunsaker

* * *

A.S.O.R.C., Chicago—Short talks on the problems of the Air Service in the next war and the types of airplanes that are being developed to meet these problems were given at the May meeting of the Air Service Officers Association of the Sixth Corps Area, in Chicago. The problems were presented by Lieut. K. T. Price, A.S.O.R.C. and the descriptions of the machines being developed were given by Lieut. Sallas M. Speer, A.S.O.R.C.

Following their remarks, Maj. W. S. Woof of the Regular Army spoke for some minutes on customs of the Service, and the necessity of maintaining a high degree of discipline.

* * *

Radio Operators Wanted in Air Service—The Air Service of the Army is looking for radio operators and can guarantee service to qualified amateurs and operators with commercial experience who enlist in the Air Service. Pay runs from $21 for a private up to $100 per month for non-commissioned officers on a flying status as radio operators. Details can be secured at any recruiting office or by writing to the Chief of Air Service.

New Radio Sets for Service Airplanes—The service planes of the Army Air Service will soon be equipped with new combination radio sets capable of transmitting both telegraph and telephone messages between airplanes and the ground or two planes in the air. The new sets are of three types; for pursuit, observation and bombing airplanes, and are the latest developments of the Radio Section, Signal Corps.

Although the specifications have been drawn up and bids called for by the Signal Corps, no descriptions of the new aerial radio equipment have been released and the instruction booklets have not yet been printed. It is said however, that they are a big improvement on the sets now in use in the Army Air Service. The largest and strongest set, S. C. R. 135, designed for bombing planes, such as the twin-engined Martins, will have a telephone transmission radius for plane to ground of about 75 miles, and a telegraph radius from plane to ground of about 200 miles.

The new equipment will place the American Army flying service far in advance of any other nation in radio operation. For pursuit planes SCR 133 is designed to give a reliable plane to plane telephone radius up to five miles; while set 134, for observation planes, like the DH4s, will insure radiotelephony between two planes on the wing up to about ten miles. The largest sets, to be installed in the Martins, it is expected will make aerial conversation possible up to 25 miles. In aviation radio work a trailing antenna is used as an aerial, and for ground the metal parts of the plane are employed.

Previously radiophone messages have only been carried on between planes over short distances, as in "voice-control" flying, where the commander of a squadron directs the manœuvers of his pilots, but with the new equipment officers of the Air Service hope to employ radiotelephony to a greater extent and see a far larger application of radio to flying operations.

Naval Aviation

Naval Orders—Lieut. Henry S. Kendall, det. U.S.S. Nevada; to temp. duty Naval Air Station Pensacola, Fla.

Lieut. Francis W. Reichelderfer, det. Naval Air Station Hampton Roads, Va.; to duty Sperry Gyroscope Co., Brooklyn, N. Y.

Lieut. Daniel W. Tomlinson, det. Naval Air Station San Diego, Calif.; to duty U.S.S. Oklahoma.

Lieut. W. Ivan King (M.C.), det. Naval Air Station Pensacola, Fla.; resignation accepted July 7, 1922.

Lieuts. Paul Cassard, Thomas A. Gray, jr., George R. Henderson, Samuel B. McMurrian, Cyril T. Simard, det. Naval Air Station Pensacola, Fla.; to duty Air Squadrons, Atlantic Fleet.

Lieut. Allen B. Smith, det. officer in charge Navy Recruiting Station Newark, N. J.; to temp. duty Naval Air Station Pensacola, Fla.

The following officers have been assigned to temporary duty at Naval Air Station Pensacola, Fla. (flying training): Lieut. (j.g.) Adrian O. Rule; Lieuts. William H. Buracker, Forrest P. Sherman; Ensigns Eudene F. Burkett, Carleton C. Champion, Charles A. Collins, Frank H. Conant, Marion E. Crist, Lawrence W. Curtin, Earl R. DeLong, James D. Hazelden, Dixwell Ketcham, Eugene W. Kiefer, Trevor Lewis, Clyde W. Smith, Richard C. Wiestling, James L. Wyatt, George F. Burdick, Thomas S. Combs, John P. Curtiss, John A. Dillon, James H. Doyle, Harold F. Fick. Cato D. Glover, Edward K. Pare, Rovert C. Rasche, George N. Rosenberry, George A. Seitz, William G. Tomlinson, Sam L. La Hache.

Lt. Comdr. William Gower (Supp. Corps), det. Naval Aircraft Factory Philadelphia, Pa.; to conn. f. o. U.S.S. Pittsburgh and on board as supply officer when commissioned.

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Great Lakes Training School—Last week witnessed the graduation of twenty men from the Machinist Mates and Aviation M.M. courses at the Great Lakes Naval School. Seventeen new men for instruction in aviation carpentry and seven in the metalsmith's courses were enrolled.

Reserve Orders—The following officers of the Reserve Force have been ordered "to home:" Lieuts. Robert S. Hedtler, Clarence N. Keyser, Wellington E. Stickley, Robert D. Hively, John W. Iseman, William T. Miller, Ira D. Spaulding, Arthur Laverents, Lauron H. Lovelace, Oscar L. Ostin, Robert G. Stephens, Walter L. Richardson, George E. Rumill; Lieut. (j.g) George H. Himes; Ens. Alton N. Parker.

Lieut. Herman W. Lucas, det. Naval Air Station Anacostia, D. C., and Lieut. Fred H. Cage, det. Naval Air Station Pensacola, Fla.; hon. discharged from active service.

Lieut. James P. Farnham, det. Air Squadrons, Atlantic Fleet; to R/S Philadelphia, Pa.

Lieuts. Fred H. Gage and Philip D. Naugle, to duty Naval Air Station Pensacola, Fla.

Lieut. Warren L. Porter, det. Air Squadrons, Atlantic Fleet; to HDAS.

Lieut. Harry A. Reed, det. Naval Air Station San Diego, Calif.; to HDAS.

• • •

Survey of Mississippi Delta—The completion of the aerial mapping of the Mississippi River Delta, has been completed according to a report received by the Bureau of Naval Aeronautics from the Pensacola Station.

The R6L seaplane in charge of the station photographic officer which was at Burrwood, La., in connection with the photographing of the Delta for the U. S. Coast and Geodetic Survey and the U. S. Army Engineers Corps has been flown to New Orleans, La., where an aerial map of the city will soon be undertaken for the local Association of Commerce.

• • •

Aviation Mechanics School—A detachment of 87 men composed of volunteers from the Aviation Mechanics' School went to Milwaukee, Wis., in charge of Boatswain G. F. Kahle, U.S.N., to aid in the laying out and inflating of civilian and military balloons entered in the National Balloon Race. It is deemed that while weather conditions were unfavorable for this class of work, that these conditions gave the men additional information and experience which they would have gained had all conditions been favorable. All balloons were successfully launched, the start of the race being a complete success.

Coming Aeronautical Events

AMERICAN

Sept. 4 — *Detroit Aerial Water Derby, Detroit. (Curtiss Marine Flying Trophy Competition.)*

Sept. 30 — *First Annual Interservice Championship Meet. (In preparation.)*

Oct. 12-14 — *Detroit Aerial Derby, Detroit. (Pulitzer Trophy Race.)*

FOREIGN

August — *Coupe Jacques Schneider. (Seaplane speed race.) Naples, Italy.*

August — *Tyrrhenian Trophy. (International Seaplane Competition.) Naples, Italy.*

Aug. 6 — *Gordon Bennett Balloon Race, Geneva, Switzerland.*

Aug. 6-20 — *Soaring and Gliding Competition, Clermont-Ferrand, France.*

Aug. 9-24 — *Soaring and Gliding Competition, Gersfeld, Germany.*

September — *Grand Prize of Italy. (International Airplane Competition.) Milan, Italy.*

Sept. 22 — *Coupe Henri Deutsch de la Meurthe. (Airplane speed race.) France.*

American elimination trials, if required, to be held about Aug. 15, at Mitchel Field, L. I.

October — *International Parachute Competition. Rome, Italy.*

Foreign News

France—The Associated Press reported on June 8, that an autonomous air ministry w[illegible]d be created within the Ministry of War under a bill introduced in the Chamber of Deputies by war minister Maginot. The measure calls for the appointment of forty colonels, forty-five lieutenant colonels and 140 majors, these to be placed under the jurisdiction of Laurent Eynac, under secretary of state for aeronautics. In addition, three colonels, ten lieutenant colonels and fifteen majors would be taken over from the cavalry units. Official figures given out by M. Maginot show that in 1921 there were 92 airplane accidents in the French aviation service, 72 pilots and mechanics meeting death.

The traffic of the Bourget airport (Paris) is increasing considerably, according to *La Journée Industrielle* of April 9-10. In March, 1922, there were recorded 315 airplanes, carrying 846 passengers and 21,908 kilos of merchandise. The corresponding figures for March, 1921, were 250 airplanes with 681 passengers and 8,725 kilos of merchandise.

* * *

Great Britain—New regulations for securing greater safety on the Paris-London air route have been accepted at a meeting of French and British pilots. They agreed to the outward and inward routes being separated by a distance of approximately 10 km. (6¼ miles). This arrangement will add slightly to the mileage of the route from London to Paris, and necessitate some change in the ground arrangements, including the provision of supplementary landing grounds for cases of emergency. The line from Paris to London will be via Beauvais, Calais, and Dover, while the return journey will be by Folkestone and Boulogne and then well to the right of the small hills at Cambras and Beauvais.

On May 7, the first of the DH34 machines belonging to the Instone Air Line made the inaugural flight from London to Brussels and back.

One of the regular pastimes now for pilots flying between London and Paris on the British machines equipped with wireless is to ring one another up and have a chat in the air.

* * *

Czechoslovakia—Aerial passenger and mail service between Prague and Vienna will soon be opened it was reported to the Department of Commerce a few days ago. Planes will leave Prague on Monday, Wednesday and Friday at 1.30 p. m., being due at Vienna at 3.30 p. m. From Vienna planes will leave for Budapest at 4 p. m., making the trip in 1 hr. 40 min. Planes will leave Budapest on Tuesday, Thursday and Saturday at 6.45 a. m., and are due to arrive at Vienna at 8.30 a. m. Leaving Vienna at 9 a. m. they are scheduled to arrive at Prague at 11 a. m. The fare from Budapest to Prague is said to amount to 770 Czechoslovakian crowns.

Brief Trade Notes

Vincent Astor's new Loening Air Yacht will be delivered to him within the next three weeks, and Harold Vanderbilt's machine of the same design will be ready for the owner early in July.

Gordon Thorne, Chicago sportsman, recently purchased a Curtiss Seagull. The Chicago *Tribune* now has a Curtiss machine for quick news gathering and photographic purposes, in charge of Morrow Krum, its aviation editor.

The Fairchild Aerial Camera Corp. of New York, is making an aerial map of Newark, N. J.

Walter T. Varney of San Francisco is distributing aerial time tables of his commercial operations, 5 cents for ⅛ air mile between San Francisco, Los Angeles and Salt Lake City.

Separate orders have recently been placed by the Air Service with the Lawrence Sperry Aircraft Corp. of Farmingdale, L. I., for five and twenty "Messenger" type planes, respectively.

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